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SCREW SUBSTITUTE
[SCHRAUBENERSATZ]

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SCREW SUBSTITUTE /1*

The object of the present invention is a substitute for screws that can be quickly and cheaply manufactured of a less valuable material, which simultaneously offers a protection against unintended loosening and unscrewing and offers a savings in time during use.

In fact, a method for preventing the unscrewing of screws is known, in that the screw is divided along its length, the parts that are formed in this way are provided with a rotation axle by a transverse pin and that then a second screw is used in order to press, by means of the associated nut that is mounted on a screw half, against an abutment connected to the other screw part so that a scissors-like unfolding of the screw halves is caused. In contrast, with the object of the current invention, unscrewing is prevented in a simple manner in that this screw substitute consists not of round, but of flat parts, which are driven into the walls of the drilled hole, over its entire length, with lateral projections, i.e. not resting in recesses that form in an uninterrupted screw thread.

The screw substitute according to the invention thus engages, in its end position, into completely undamaged wood that it only grazes in an even manner during its introduction. Since the introduction channel will just be sufficient for introduction only, but in contrast the holding will be achieved by a special sideward movement of the entire shaft extending beyond the movement plane of the introduction so that the holding teeth engage in completely undamaged wood.

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*Numbers in the margin indicate pagination in the foreign text.

As already mentioned, it is in the sense of the present invention, using as little material as possible during the manufacturing of the screw substitute, to use, i.e., sheet metal that is designed in an angular, or also in a round shape. However, it is in no way a screw manufactured of sheet metal, which would thus be guided by turning it through the guides of the screw hole as, for example, for a machine screw. It is much more true, in this case, that the locking of the screw substitute with its guide, is not reached until the lateral movement, i.e., the spreading of the toothed racks and/or shanks. It thus in no way corresponds to the known art of manufacturing screws of sheet metal. That is because the present screw substitute is actually a screw that is not screwed in, but a toothed shaft, shank or metal rib with any cross section or a combination of such ribs, which is not caused to act until there is a lateral displacement.

Essentially, the present invention consists of a toothed rack provided on one size with teeth or with projections of any kind, the highly toothed side of which is pressed into the insertion hole, by means of a splint pin, against one wall of this hole, whereby the /2
teeth embed themselves into the material and thus prevent the rack from sliding out, while the splint pin that has been driven in and causes a lateral shift is held in its position by smaller channels of any type that are mounted on the side of the toothed rack opposite the large teeth. Generally these toothed racks will be combined in groups of two or four for use, as can be seen in the drawing.

The toothed racks **1, 2** (Figs. 1 to 17) are manufactured of iron, steel or metal bars by punching them from sheet metal, from wire, from castings, pressed castings, or by the forging press or in another way. On the outer side across from each other, they have teeth **3, 4** that penetrate the material, e.g., wood, when the racks **1, 2** are spread or pushed apart. During this penetration the racks **1, 2** attempt to push a bit deeper into the material according to the shape of teeth **3, 4** and hold fast an object that is attached to the material. This holding can occur due to knee pieces **5, 6** (Figs. 1 to 16), which extend outward on the upper end over the racks **1, 2** and project from them at about a right angle or also by teeth that are oriented opposite to those of the lower parts (see teeth **7, 8** in Fig. 7) or have a uniform slope like in the previous screws, while the racks **1, 2** have a neck that is free of teeth toward the upper end or continue to have the same teeth as the other parts. The teeth **3, 4** can be formed in different ways, e.g. sawtooth-like (Figs. 1, 2 and 7) or according to the screw thread cross section in the previous screws (Figs. 5, 6, 8, 9, 10, 11, 13, 14, 15) or even in such a way so that during spreading and/or when the racks **1, 2** are pulled apart, whether they are circular or straight, they are pulled somewhat more deeply into the material (Figs. 3 and 4) as a result of their greater slope on their upper side than that caused by the spreading angle. Also the teeth **3, 4,** can be designed so that they are narrow on their lower ends in the manner of a cutting edge (Figs. 18 and 19), so that the toothed racks can also be driven into the material like nails without essentially losing holding force.

However, the teeth **3**, **4** grip into undamaged wood, since after being driven in, during which the racks **1**, **2** are pressed against each other, the holding engagement does not occur until the teeth **3**, **4** grip, whereby these penetrate beyond the driving channel into undamaged wood.

On one hand, the screw substitute can be manufactured of two racks **1**, **2** running out from a common point (Figs. 1 to 5), the cross section of which is shown in A-B in Fig. 3a, or running into a tip that is composed of two halves (Figs. 13 to 15), while the holding of the two racks **1**, **2**, in their lengthwise direction is ensured by a perforated rib **9** (Fig. 13) in order that they can easily be bent from their adjacent form shown in Fig. 13 to the tube-like form shown in Fig. 14. The shape of the screw substitute shown in Figs. 13 to 17 differs from the other shapes due to the tube-like design (Fig. 14) so that in this case the usual hole can be used as an insertion hole, while for the shapes according to Figs. 1 to 5, a corresponding wedge-shaped hole is more useful as an insertion hole. The center teeth, **3**, **4** (Fig. 13) are obtained by stamping and bending and can be mounted on the tubes in several rows, as Fig. 17 shows, while the teeth **10**, **11** are pressed on the side edges and bent appropriately.

Also, the tube-shaped form is approximately the same as a screw substitute that develops due to the combination of the embodiments according to Figs. 3 and 4 with the embodiment according to Fig. 6, namely two racks **1**, **2** that correspond otherwise to those in Figs. 3 to 15, which do not come out of a common tip, but on their lower part

have a notch **11** (Fig. 6) the walls **12, 13** of which are embedded between the racks **1, 2** according to Figs. 3 and 4, that surrounds a part of the tip so that a cross-shaped cross section is formed (Fig. 6a) that fits well into a drilled hole.

Still other forms of the screw substitute are shown in Figs. 7 and 10 to 12. In this case, the racks **1, 2** are separated from each other - as can also be carried out with the two half-tubes according to Figs. 13 to 17 - not in the same movement plane, but in two adjacent movement planes parallel to each other. According to Fig. 7, the racks **1, 2** are individual and have the same shape and arrangement, namely with the stamped cutout **14** oriented perpendicular to the rack, the sheet metal part of it that is removed being bent to form a catch **15** in one of the racks, such that the catch is only as long as the width of the sheet metal. The cutout **14** is long enough so that /3 the catch **15** has enough room for movement in it that is double the length of the teeth **3, 4**. If the two racks **1, 2** are now sunken, they are held together at the same height. The same device can also be made on the upper end of the racks **1, 2**. When the racks **1, 2** are driven apart, both ends have an equal amount of play for movement as a result of the arrangement.

The form according to Figs. 8 and 9 also shows a confinement of both racks **1, 2** in the same movement plane, but in such a way that during lowering one bar is deeper than the other. The racks **1, 2** are connected to each other, articulated by strips **17, 18**. Once the bar **1** is completely lowered, the bar **2** will also be driven in completely. As

a result of the teeth that are sharp on the bottom, they dig into the wood since during this driving, the spreading of the racks **1, 2** from each other occurs due to the strips **17, 18.**

Like the embodiment according to Fig. 7, the one according to Figs. 10 to 12 has different movement planes. In this case, a connection can otherwise be produced in the same way as in the embodiment according to Fig. 7, but the bar is not perpendicular to the shaft of the toothed rack, rather it forms a diagonal plane that can also be produced on the upper end in the same way. The shank **1** first is driven into the insertion hole. During sinking of the shank **2,** the catch **20** slides along the lower edge of the slot **19** and drives the teeth laterally into the wood. Then, due to the wedge **21,** the shank **2** is also pressed upward to the side and driven in so completely that the catch **22** of rack **2** is introduced into the hole **23** of rack **1** and also held in this way. Figs. 11 and 12 show the same arrangement, only in that the catch **20** and the slanting plane **19** are mounted laterally on the edge of the toothed rack.

In order to bring the toothed racks into action as a screw substitute, they must ultimately be pressed apart by the sinking caused by impact or strong pressure into the insertion hole of the material so that the teeth completely penetrate into the material and enlarge the hollow by their structure. In the embodiments according to Figs. 7 to 12, of which Figs. 12 shows the device according to Fig. 11, seen from the right, and the condition of complete sinking, the spreading method has already been described. The other embodiments

best result from spreading by a splint pin that is driven between the shanks involved. This splint pin is oriented to the selected form of the screw substitute; in the embodiment according to Fig. 1, it only needs to be relatively thin, but still at best is so long that it penetrates almost completely into the slot between shanks **1** and **2**, so that not only the upper, but also the lower part of the toothed rack, bulging out to the side, embeds its teeth tightly into the material. A splint pin such as this can be made of wood or soft iron or metal of any type. The form of the splint necessary for the embodiments according to Figs. 7, 10 and 11 is shown in Fig. 10. With movement of the shank in the same plane, the other types require a form of the splint as shown with 24 in Fig. 5 with bevels on the tip that are adapted to the form of the shank, as they are beveled on four sides for the embodiment according to Fig. 6a or end in a round tip. Fig. 5 shows that the associated splint pin can be stamped out simultaneously together with the toothed racks and in fact, in such a way that they can easily be broken away from the other parts due to notches **26**, but are available as a part that cannot be lost easily.

In order to hold the spreading splint pin in its recess, on the insides of the toothed racks, small teeth or grooves are applied; the same is true even in the embodiments according to Figs. 13 to 17, the round screw substitute. In this case, the splint pin **24** is round, either of wood or of sheet metal bent into a tube and is held by the fine teeth **27, 28** that are stamped on the inside of the tubes, whereby these teeth act as barbs, as all of the teeth can be designed as barbs

in the present invention, where it is not only a case of holding, but also simultaneously a case of further pulling of the toothed racks and/or pulling of the objects to be fastened.

In order to ensure tight penetration of all teeth, on the inner sides of the toothed racks exposed to the pressure of the splint pin, bulges are formed toward the tip (Figs. 3, 4, 6), which when the splint pin is driven in especially greatly spread the toothed racks at these deep locations. For this purpose, toward the tip the toothed racks are to be designed so that they are as thin and bendable as is practically feasible. Besides that, it is clear that both with the splint pins, as well as with one of the toothed racks 1 or 2, some /4 kind of hooks or eyes or the like can be directly connected to extend them, especially as in the embodiment according to Fig. 15, as is also true for the usual screws (see Fig. 20, which shows this clearly). The toothed racks can already obtain a spread form originally by the way they are connected, as Fig. 4 shows, whereby they are pressed together when driven in, and later the teeth are held pressed into the wood, even without a splint pin, either with a straight structure or one that narrows toward the top (Fig. 3). Also, at the lower connection they can be formed in a tube shape, i.e., be given a round structure (Fig. 14) and in this way approximate the structure of current screws and fill up a drilled hole.

The spreading can also be carried out by a special shoulder formed so that it is either circular or square, as Figs. 1 and 2 show

with 31 and as is also implemented in Figs. 21 to 24. Of these, Figs. 21 and 22 have a round shoulder, a piece of sheet metal that surrounds the knee **5** and **6** of the substitute screw, which when driven in by means of a chisel or similar tool, drives a wedge-like hollow **32** in the center between the shanks **1, 2** whereby the tabs **5, 6** slide over the edges of the shoulder **31** and hold the head and/or shoulder tightly. Also a splint pin can be mounted on the shoulder.

Figs. 23 and 24 have a shoulder **31** with a square shape. In addition, the knee-like tabs **5** and **6** can also be designed with a circular structure as can be seen in Figs. 13 and 14.

PATENT CLAIMS

1. Screw substitute, characterized in that it consists of flat parts that are provided over their entire lengths with lateral projections, in radial direction so they can be driven into the wall of the drilled hole and that in the drilled hole, no scoring develops that forms an uninterrupted screw thread.

2. Screw substitute according to Claim 1, characterized by groups of two toothed metal ribs lying in movement planes that are the same or parallel to each other, or of three, four or more toothed metal ribs mounted around an ideal axis that are slightly connected to each other or can be connected to each other, located across from each other and provided on the outside with grooves that are saw-toothed or similar to those of screws, or with prongs whose teeth or indentations penetrate into the material due to a spreading of the ribs.

3. Screw substitute according to Claims 1 and 2, characterized in

that the neck has sawtooth-like grooves whose direction is opposite to those of the other and, when the shanks are spread, engage in the object placed between the base and the heads of the shank so that it holds the object on its base.

4. Screw substitute according to Claims 1 and 2, characterized in that the teeth are formed in such a way that, while penetrating into the wood during the spreading, they pull the head deeper while the underside of the teeth is sharpened like a cutting edge in order to better overcome the resistance of the wood and to leave the wood as unharmed as possible.

5. Screw substitute according to Claims 1 and 2, which will especially replace machine screws, characterized in that the grooves of the shanks correspond to the screw thread profiles of the machine screws and the toothed racks are curved cylindrically.

6. Screw substitute according to Claims 1 and 2, characterized in that the knees of the heads are pressed in such a way that they are round enough so that, together, they are similar to the usual screw heads.

7. Screw substitute according to Claims 1 and 2, characterized in that shanks that belong together are already at a distance from each other or are spread in rest position so that they have to be pressed together for the purpose of introduction into the material, and after being pressed against the wall of the drilled hole by a splint of any type, are already inclined to remain in engagement by themselves.

8. Screw substitute according to Claims 1 and 2, characterized in

that the shanks the are connected at their tip are rounded outward a short distance above the tip and also, on the inner sides, have bulges so that they are elastic, e.g., like push buttons, but at the same time when they are spread they embed themselves with their teeth tightly in the walls of the insertion slot and/or of the drilled hole.

9. Screw substitute according to Claims 1 and 2, characterized in that on the insides of the shanks, slight grooves or elastic prongs are arranged, for the purpose of securely holding the splint, which can also be formed of sheet metal tubes and is driven in for /5 spreading and/or lateral displacement of the shanks, it also being possible for this splint to be provided with corresponding grooves or resilient prongs.

10. Screw substitute according to Claims 1 and 2, characterized in that the shanks are not connected directly, but are connected or can be brought into connection by means of a pin that can be guided in a lateral slot of the other shank or by means of one or two transverse racks, with two pegs each, or by means of one or more tabs of one shank and one or more grooves of the other that run diagonally or even of a guide of any type that runs diagonally so that the spreading of the shanks goes downward and uniformly upward, i.e., with equally great spreading capacity toward the tip as at the head, as soon as both shanks are introduced equally deep into the insert opening, whereby on the head the usual spreading can also be caused by a splint as specified in Claim 9.

11. Screw substitute according to Claims 1 and 2, characterized

in that to spread the shanks, a special head is used that consists of a soft metal plate that has a rim on one side that is guided under the heads of the shanks, and on the other hand, a splint or a recess that can be driven between the shanks, whereby the splint permanently holds them apart in that this head or cap is gripped by means of the rim under the knee of the shank and is held tight.

12. Screw substitute according to Claims 1 and 2, characterized in that a splint intended to spread the shanks is, manufactured in one piece and attached to the device but in such a weak manner - due to a notch - that it can easily be broken off of it for use.

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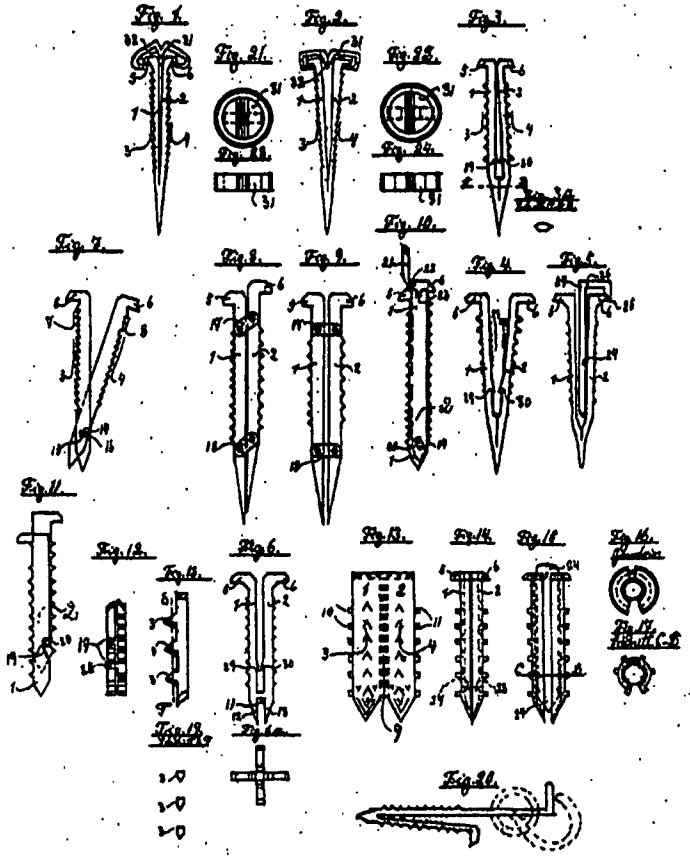

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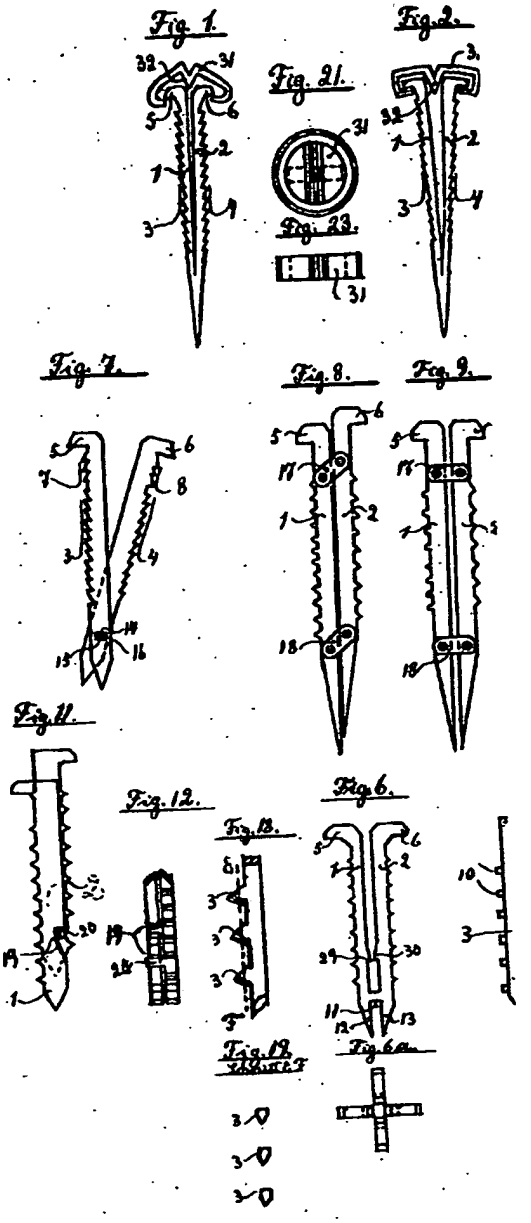

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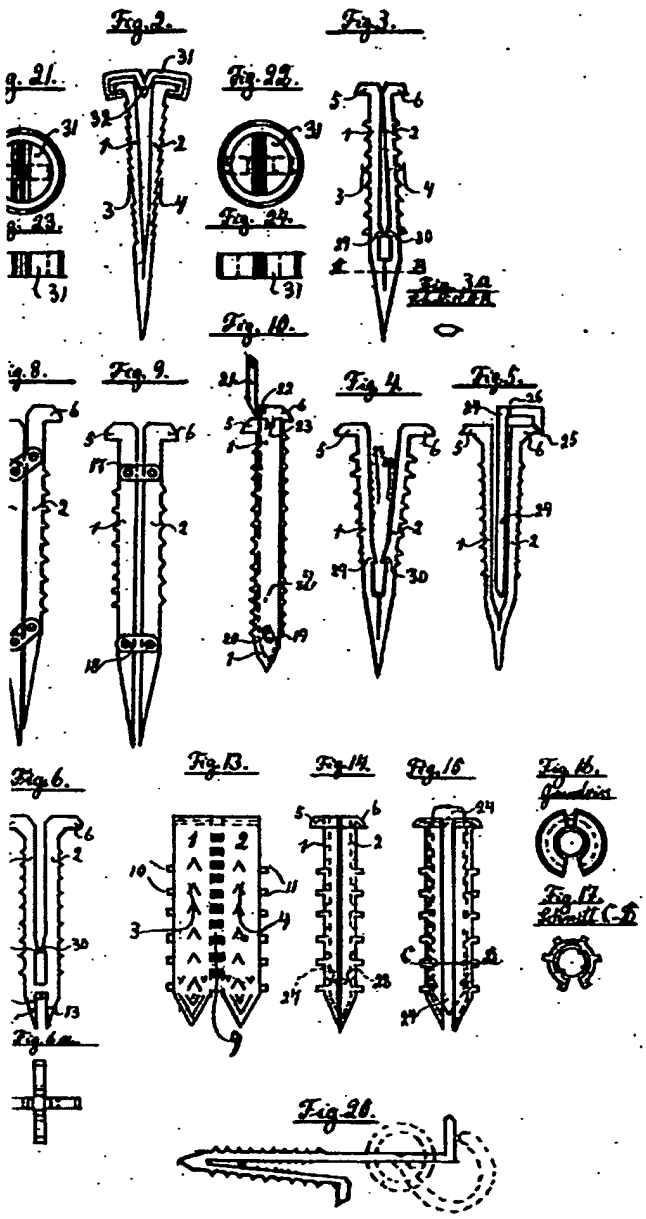

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